Subject: - Thermal Engineering (22337)

SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Fundamentals of Thermodynamic	14
2	Ideal Gases and Ideal Gas Processes	22
3	Steam and Steam Boiler	20
4	Steam Turbines	24
5	Steam Condensers	12
6	Heat transfer and Heat exchangers	12
Total Marks :-		**102**

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY | Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

BOARD THEORY PAPER PATTERN FOR TEN (22337)

Q.1		**Attempt any FIVE 5*2=10**
	a)	Fundamentals of Thermodynamic
	b)	Fundamentals of Thermodynamic
	c)	Steam and Steam Boiler
	d)	Steam Turbines
	e)	Steam Turbines
	f)	Steam Condensers
	g)	Heat transfer and Heat exchangers
Q.2		**Attempt any THREE 3*4=12**
	a)	Fundamentals of Thermodynamic
	b)	Ideal Gases and Ideal Gas Processes
	c)	Ideal Gases and Ideal Gas Processes
	d)	Steam and Steam Boiler
Q.3		**Attempt any THREE 3*4=12**

	a)	Steam Turbines
	b)	Steam Turbines
	c)	Ideal Gases and Ideal Gas Processes
	d)	Steam and Steam Boiler
Q.4		**Attempt any THREE 3*4=12**
	a)	Steam and Steam Boiler
	b)	Ideal Gases and Ideal Gas Processes
	c)	Ideal Gases and Ideal Gas Processes
	d)	Heat transfer and Heat exchangers
	e)	Steam Condensers
Q.5		**Attempt any TWO 2*6=12**
	a)	Steam Turbines
	b)	Heat transfer and Heat exchangers
	c)	Steam and Steam Boiler
Q.6		**Attempt any TWO 2*6=12**
	a)	Steam Turbines
	b)	(i) Fundamentals of Thermodynamic
		(ii) Steam Condensers
	c)	Ideal Gases and Ideal Gas Processes

CLASS TEST - I

PAPER PATTERN

COURSE: - Thermal Engineering (22337)

PROGRAMME: - Mechanical Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
1	**Fundamental of Thermodynamics**	**CO-337.01**
2	**Ideal Gas and Ideal Gas Processes**	**CO-337.02**
3	**Steam and Steam Boiler**	**CO-337.03**

Q.1	**Attempt any FOUR 4*2=8Marks**	**Course Outcome (CO)**
a)	Fundamental of Thermodynamics	CO-337.01
b)	Fundamental of Thermodynamics	CO-337.01
c)	Ideal Gas and Ideal Gas Processes	CO-337.02
d)	Ideal Gas and Ideal Gas Processes	CO-337.02
e)	Steam and Steam Boiler	CO-337.03
Q.2	**Attempt any THREE 3*4= 12Marks**	
a)	Fundamental of Thermodynamics	CO-337.01
b)	Fundamental of Thermodynamics	CO-337.01
c)	Ideal Gas and Ideal Gas Processes	CO-337.02
d)	Steam and Steam Boiler	CO-337.03

CLASS TEST - II

PAPER PATTERN

COURSE: - Thermal Engineering (22337)

PROGRAMME: - Mechanical Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
4	**Steam Turbines**	**CO-337.04**
5	**Steam Condenser**	**CO-337.05**
6	**Heat transfer and Heat Exchangers**	**CO-337.06**

Q.1	**Attempt any FOUR 4*2= 8Marks**	Course Outcome (CO)
a)	Steam Turbines	CO-337.04
b)	Steam Turbines	CO-337.04
c)	Steam Condenser	CO-337.05
d)	Steam Condenser	CO-337.05
e)	Heat transfer and Heat Exchangers	CO-337.06
Q.2	**Attempt any THREE 3*4= 12Marks**	
a)	Steam Turbines	CO-337.04
b)	Steam Condenser	CO-337.05
c)	Steam Condenser	CO-337.05
d)	Heat transfer and Heat Exchangers	CO-337.06

COURSE OUTCOME

(CO)

COURSE: - Thermal Engineering (22337)

PROGRAMME: - Mechanical Engineering

CO. NO.	Course Outcome
CO-337.01	Apply laws of thermodynamics to devices based on thermodynamics.
CO-337.02	Use first law of thermodynamics for ideal gas in closed system.
CO-337.03	Use relevant steam Boilers.
CO-337.04	Use relevant steam nozzles and turbines.
CO-337.05	Use relevant steam condenser.
CO-337.06	Use suitable modes of heat transfer.

1. Fundamentals of Thermodynamic

Position in Question Paper   **Total Marks-14**

Q.1. a) 2-Marks.
Q.1. b) 2-Marks.
Q.2. a) 4-Marks.
Q.3. a) 4-Marks.
Q.3. d) 4-Marks.
Q.4. a) 6-Marks.

Descriptive Question

1. Differentiate between Heat and Work.

2. State clausius statement of second law of thermodynamics.

3. State extensive property and Intensive property with two examples each.

4. Explain the application of second law of thermodynamics to refrigerator.

5. State steady flow energy equation and apply it to condenser with block diagram.

6. State steady flow energy equation and apply it to Turbine with block diagram.

7. State First law of Thermodynamics.

8. A gas occupying 0.26 m3 at 300°C and 0.4 MPa pressure expands till volume becomes 0.441 m3 and pressure 0.26 MPa. Calculate the change in internal energy per kg of gas.CP = 1 kJ/kg K, CV = 0.71 kJ/kg K.

9. Define:
   a) Flow work
   b) Entropy

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

MCQ Question

(Total number of Question=Marks*3=14*3=42)

Note: Correct answer is marked with **bold.**

1. Heat transfer takes place as per -
   a) zeroth law of thermodynamics
   b) First law of thermodynamic
   c) second law of the thermodynamics
   d) Kirchhoff's law

2. _____is any measurable characteristics of a substance that can be calculated or deduced.
   a) Property
   b) State
   c) Phase
   d) None of the mentioned

3. _____ of a system gives the condition of a system as specified by its properties.
   a) Property
   b) State
   c) Phase
   d) None of the mentioned

4. In an isolated system, _____ can be transferred between the system and its surrounding.
   a) only energy
   b) only mass
   c) both energy and mass
   d) neither energy nor mass

5. Which of the following is an extensive property?
   a) Volume
   b) Pressure
   c) Viscosity
   d) All of the above

6. The extensive properties of a system, _____
   a) are independent of the mass of the system
   b) depend upon temperature of the system
   c) depend upon the mass of the system
   d) none of the above

7. According to Kelvin-Planck statement, it is impossible to construct a device operating on a cycle which transfers heat from ____
   a) low pressure heat reservoir to high pressure reservoir
   b) low temperature heat reservoir to high temperature reservoir
   c) high pressure heat reservoir to low pressure reservoir
   d) high temperature heat reservoir to low temperature reservoir

8. Which of the following relations is true, for coefficient of performance (C.O.P)?
   a) **(C.O.P)heat pump – (C.O.P)refrigerator = 1**
   b) (C.O.P)heat pump – (C.O.P)refrigerator > 1
   c) (C.O.P)heat pump – (C.O.P)refrigerator < 1
   d) (C.O.P)heat pump – (C.O.P)refrigerator = 0

9. The unit of temperature in S.I. units is
   a) Centigrade
   b) Celsius
   c) Fahrenheit
   d) **Kelvin**

10. Which of the following is an intensive property of a thermodynamic system?
   a) Mass
   b) **Temperature**
   c) Energy
   d) Volume

11. Intensive property of a system is one whose value
   a) Depends on the mass of the system, like volume
   b) **Does not depend on the mass of the system, like temperature, pressure, etc.**
   c) Is not dependent on the path followed but on the state
   d) Is dependent on the path followed and not on the state

12. The heat and mechanical energies are mutually convertible. This statement was established by
   a) Boyle
   b) Charles
   c) **Joule**
   d) None of these

13. Properties of substances like pressure, temperature and density, in thermodynamic coordinates are
   a) Path functions
   b) **Point functions**
   c) Cyclic functions
   d) Real functions

14. Which of the following is the property of a system?
   a) Pressure and temperature
   b) Volume and density
   c) Enthalpy and entropy
   d) **All of the above**

15. Which of the following items is not a path function?
   a) Heat
   b) Work
   c) Kinetic energy
   d) **Thermal conductivity**

16. Heat and work are
   a) Point functions
   b) System properties
   c) **Path functions**
   d) Intensive properties

17. Zeroth law of thermodynamics
   a) Deals with conversion of mass and energy

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

b) Deals with reversibility and irreversibility of process

c) States that if two systems are both in equilibrium with a third system, they are in thermal equilibrium with each other

d) Deals with heat engines

18. The basis for measuring thermodynamic property of temperature is given by

    a) Zeroth law of thermodynamics   c) Second law of thermodynamics

    b) First law of thermodynamics   d) Third law of thermodynamics

19. According to first law of thermodynamics

    a) Work done by a system is equal to heat transferred by the system

    b) Total internal energy of a system during a process remains constant

    c) Internal energy, enthalpy and entropy during a process remain constant

    d) Total energy of a system remains constant

20. When two bodies are in thermal equilibrium with a third body, they are also in thermal equilibrium with each other. This statement is called

    a) Zeroth law of thermodynamics   c) Second law of thermodynamics

    b) First law of thermodynamics   d) Kelvin Planck's law

21. Energy can neither be created nor destroyed but can be converted from one form to other is inferred from

    a) Zeroth low of thermodynamic   c) Second law to thermodynamics

    b) First law of thermodynamics   d) Basic law of thermodynamics

22. First law of thermodynamics furnishes the relationship between

    a) Heat and work

    b) Heat, work and properties of the system

    c) Various properties of the system

    d) Various thermodynamic processes

23. Total heat of a substance is also known as

    a) Internal energy   c) Thermal capacity

    b) Entropy   **d) Enthalpy**

24. Kelvin-Planck's law deals with

    a) Conservation of work   c) Conversion of work into heat

    b) Conservation of heat   **d) Conversion of heat into work**

25. A perpetual motion machine is

    a) A thermodynamic machine

    b) A non-thermodynamic machine

    c) A hypothetical machine

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

d) A hypothetical machine whose operation would violate the laws of thermodynamics

26. One Joule (J) is equal to

a) 1 kN-m

b) 1 N-m

c) 10 kN-m/s

d) 10 N-m/s

27. In an isolated system,can be transferred between the system and its surrounding.

a) only energy

b) only mass

c) both energy and mass

d) neither energy nor mass

28. Which of the following is an extensive property?

a) Volume

b) Pressure

c) Viscosity

d) All of the above

29. Which of the following relations is true, for coefficient of performance (C.O.P)?

a) (C.O.P)heat pump – (C.O.P)refrigerator = 1

b) (C.O.P)heat pump – (C.O.P)refrigerator > 1

c) (C.O.P)heat pump – (C.O.P)refrigerator < 1

d) (C.O.P)heat pump – (C.O.P)refrigerator =0

30. According to Kelvin-Planck statement, it is impossible to construct a device operating on a cycle which transfers heat from

a) low pressure heat reservoir to high pressure reservoir

b) low temperature heat reservoir to high temperature reservoir

c) high pressure heat reservoir to low pressure reservoir

d) high temperature heat reservoir to low temperature reservoir

31. Which of the following energy conversion devices convert heat into work?

a) Electrical generators

b) I. C. engines

c) Condensers

d) All of the above

32. The extensive properties of a system,

a) are independent of the mass of the system

b) depend upon temperature of the system

c) depend upon the mass of the system

d) none of the above

33. All steam engines work on---------

a) Zeroth law of thermodynamics

b) First law of thermodynamics

c) Second law of thermodynamics

d) None of these

2. Ideal Gases and ideal gas processes

Position in Question Paper   **Total Marks-12**

Q.1. c) 2-Marks.

Q.2. b) 4-Marks.

Q.4. b) 6-Marks.

Descriptive Question

1. Define isentropic process and plot it on P-V and T-S diagram.
2. Derive characteristic gas equation using Boyle's and Charle's law.
3. What is universal gas constant?
4. Represent the following processes on P-V and T-S diagram.
   a) Isentropic process
   b) Isobaric process
5. Define irreversible process. State the factors making process irreversible.
6. A gas has a volume of 0.14 m3, pressure 1.6 bar and a temperature 110°C.If the gas is compressed at constant pressure until its volume becomes 0.112m3.
   Determine:
   a) Work done in compression of gas
   b) Heat given out by gas
7. A cylinder contains 0.12 m3 of air at 1 bar and 90°C. It is compressed to 0.03 m3, the final pressure being 6 bar. Find the index of compression and increase in internal energy.
8. 3 m3 of gas at 30°C and 5 bar pressure is expanded isothermally to 1 bar with low PV = C. Find work done, change in internal energy and heat transferred.
9. A certain gas has CP = 1.968 kJ/kg K CV = 1.507 kJ/kgK. Find the molecular weight and the gas constant. constant volume chamber of 0.3m3 capacity contain 2 kg of this gas at 5°C. Heat is transferred to the gasuntil the temperature is 100°C. Find the work done and change in internal energy.

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold**

1. An ideal gas is one which obeys the law pv=RT at all pressures and temperatures.
   a) True
   b) false

2. The value of universal gas constant is
   a) 8.2353
   c) 8.5123
   b) 8.3143
   d) none of the mentioned

3. Which of the following statement is true?
   a) characteristic gas constant is given by dividing the universal gas constant by the molecular weight
   b) Avogadro's number (A) = $6.023 * 10^{26}$ molecules/kgmol
   c) Boltzmann constant (K) = $1.38 * 10^{-23}$ J/molecule
   d) **all of the mentioned**

4. The equation of state of an ideal gas is given by
   a) pV=mRT, here R is characteristic gas constant
   b) pV=nRT, here R is universal gas constant
   c) pV=NKT
   d) **all of the mentioned**

5. Specific heats are constant for an ideal gas.
   a) **true**
   b) false

6. For real gases,
   a) specific heats vary appreciably with temperature
   b) specific heats vary little with pressure
   c) **both of the mentioned**
   d) none of the mentioned

7. At constant temperature, (u being the internal energy)
   a) u change when v or p changes
   b) u does not change when v or p changes
   c) u does not change when t changes
   d) u always remains constant

8. For an ideal gas, internal energy is a function of temperature only.
   a) true
   b) false

9. Which of the following statement is correct for an ideal gas?
   a) h=u+pv
   c) h=f(T)
   b) h=u+RT
   d) all of the mentioned

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

10. Characteristic gas constant is given by (here cp=specific heat at constant pressure and cv is the specific heat at constant volume)

a) R=cv – cp

c) R=cp – cv

b) R=cp + cv

d) none of the mentioned

11. The value of cp and cv depend on

a) temperature of the gas

c) pressure of the gas

b) ɣ and R

d) all of the mentioned

12. Which of the following statement is true?

a) value of ɣ for monoatomic gases is 5/3

b) value of ɣ for diatomic gases is 7/5

c) for polyatomic gases, the value of ɣ is approximately taken as 4/3

d) all of the mentioned

13. The maximum and minimum values of ɣ is

a) 1.33, 1

c) 1.67, 1

b) 2.00, 1

d) 1.25, 1

14. For a reversible adiabatic change, ds=0.

a) true

b) false

15. For an ideal gas, the specific molar volume of the gas is doubled then the pressure would be (Other parameters are same)

a) Same as before

c) Half

b) Double

d) None of the mentioned

16. Specific molar volume for an ideal gas is

a) Volume per mass

c) Volume per mole

b) Volume per molecular weight

d) None of the mentioned

17. The inverse of molar volume is

a) Molar density

c) Molar specific volume

b) Mole fraction

d) None of the mentioned

18. The summation of each of the partial pressure of the component in a system equals to the total pressure. Is

a) Dalton`s law

c) Charles`s Law

b) Boyle`s law

d) None of the mentioned

19. How is absolute pressure measured?

a) **Gauge pressure + Atmospheric pressure**

b) Gauge pressure – Atmospheric pressure

c) pressure / Atmospheric pressure

d) None of the above

20. An isobaric process, has constant _____

a) density

c) temperature

b) pressure

d) volume

21. According to Joule's law, the internal energy of a perfect gas is the function of absolute _____

   a) density   c) Volume

   b) pressure   **d) temperature**

22. When a gas is heated, change takes place in

   a) Temperature   c) Volume

   b) Pressure   **d) All of these**

23. One molecule of oxygen consists of _____ atoms of oxygen.

   a) 2   c) 8

   b) 4   d) 16

24. Which of the following variables controls the physical properties of a perfect gas?

   a) Temperature   c) Volume

   b) Pressure   **d) All of these**

25. Which of the following laws is applicable for the behaviour of a perfect gas?

   a) Boyle's law   **c) Gay Lussac's law**

   b) Charles 'law   **d) All of the above**

26. For a perfect gas, according to Boyle's law (where P = Absolute pressure, V = Volume and T = Absolute temperature)

   a) V/T = constant, if p is kept constant

   b) P v = constant, if T is kept constant

   c) T/P = constant, if v is kept constant

   d) P/T = constant, if v is kept constant

27. Specific heat of air at constant pressure is equal to

   a) 0.17   **c) 0.24**

   b) 0.21   d) 1.00

28. Boyle's law i.e. pV = constant is applicable to gases under

   a) All ranges of pressures   c) High range of pressures

   b) Only small range of pressures   d) Steady change of pressures

29. The specific heat of water is

   a) 2.512   **c) 4.187**

   b) 1.817   d) None of these

30. Gases have

   a) Only one value of specific heat

   b) Two values of specific heat

   c) No value of specific heat

   d) Under some conditions one value and sometimes two values of specific heat

31. An isothermal process is governed by

   a) Gay-Lussac law   **c) Boyle's law**

   b) Charles' law   d) Avogadro's law

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

32. The specific heat of air increases with increase in
   a) Temperature
   b) Pressure
   c) Both pressure and temperature
   d) Variation of its constituents

33. Isochoric process is one in which
   a) Free expansion takes place
   b) Very little mechanical work is done by the system
   c) No mechanical work is done by the system
   d) All parameters remain constant

34. The gas constant (R) is equal to the _____ of two specific heats.
   a) Product
   c) Difference
   b) Sum
   d) Ratio

35. According to Gay Lussac's law for a perfect gas, the absolute pressure of given mass varies directly as
   a) Temperature
   b) Absolute temperature, if volume is kept constant
   c) Volume, if temperature is kept constant
   d) None of these

36. Which law states that the specific heat of a gas remains constant at all temperatures and pressures?
   a) Charles' Law
   c) Regnault's Law
   b) Joule's Law
   37. d) Boyle's Law

38. The sum of internal energy (U) and the product of pressure and volume ($p.v$) is known as
   a) Work done
   c) Power
   b) Entropy
   d) Enthalpy

39. The term N.T.P. stands for
   a) Nominal temperature and pressure
   b) Natural temperature and pressure
   c) Normal temperature and pressure
   d) Normal thermodynamic practice

40. According to Joule's law, the internal energy of a perfect gas is the function of absolute
   a) density
   c) temperature
   b) pressure
   d) temperature

41. For real gases,
   a) specific heats vary appreciably with temperature
   b) specific heats vary little with pressure
   c) both of the mentioned
   d) none of the mentioned

42. The perfect example of an ideal gas is
   a) air
   b) hydrogen

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

c) water   d) none of the above

43. The value of universal gas constant is
   a) 8. 2353   c) 8.5123
   b) 8.3143   d) none

44. An isobaric process, has constant
   a) density   **c) temperature**
   b) pressure   d) volume

45. An ideal gas is one which obeys the law pv=RT at all pressures and temperatures.
   a) True   b) False

46. For an ideal gas, internal energy is a function of temperature only.
   a) **True**   b) False

47. Which of the following is not the unit of R?
   a) Atm.liter/K.mole   c) **N.Kg.m3/K.mole**
   b) Pa.m3/K   d) None of the mentioned

48. A cycle consisting of _____ and two isothermal processes is known as Stirling cycle.
   a) Two constant pressure
   b) Two constant volume
   c) Two isentropic
   d) One constant pressure, one constant volume

49. The change of entropy, when heat is absorbed by the gas, is
   a) **Positive**   c) Positive or negative
   b) Negative   d) None of these

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

3. Fundamentals of Thermodynamic

Position in Question Paper   **Total Marks-12**

 Q.1. c) 2-Marks.
 Q.2. b) 4-Marks.
 Q.4. b) 6-Marks.

Descriptive Question

1. Define dryness fraction and degree of superheat.
2. Differentiate water tube boiler and fire tube boilers
3. List any six methods of energy conservation in boilers.
4. State the function of :
    a) Fusible plug and
    b) Economiser
5. Define:
    a) Boiler efficiency
    b) Latent heat
6. Define:
    a) Sensible heat
    b) Latent heat
7. State the main features of Indian boiler regulations. (IBR)
8. Explain with neat sketch. Construction and working of Loeffler boiler.
9. Steam at a 6.87 bar, 205°C, enters in an insulated nozzle with velocity of 50 m/s.It leaves at a pressure of 1.37 bar and a velocity of 500 m/s. Determine the final enthalpy.
10. In a steam power cycle, the steam supply is at 15 bar and dry and saturated. The condenser pressure is 0.4 bar. Determine dryness fraction and enthalpy of steam. Determine the amount of heat supplied to 2kg of water at 25°C to convert it into steam at 5 bar and 0.9 dry.

![Maratha Vidya Prasarak Samaj's Rajarshi Shahu Maharaj Polytechnic, Nashik logo]

Maratha Vidya Prasarak Samaj's
Rajarshi Shahu Maharaj Polytechnic, Nashik
Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.
RSM POLY **Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.**

MCQ Question

(Total number of Question=Marks*3=14*3=42)

Note: Correct answer is marked with **bold.**

1. Which of the following is NOT a fire tube boiler?
   a) Cochran Boiler
   b) Lancashire Boiler
   c) Locomotive Boiler
   d) Babcock and Wilcox Boiler

2. Which of the following is NOT a valid classification of boilers?
   a) Forced circulation and natural circulation
   b) High pressure and low pressure
   c) Stationary and Portable
   d) Single fired and Double fired

3. Babcock and Wilcox boiler is an internally fired boiler**.**
   a) True
   b) False

4. Which of the following statement is NOT true about fire tube boilers**?**
   a) Hot gases are inside the tubes and water surrounds them
   b) For a given power it occupies more floor area
   c) Operating pressure can be as high as 100 bars
   d) Not suitable for large power plants

5. The classification of boilers into horizontal, vertical and inclined is done on the basis of their _____
   a) pressure
   b) method of firing
   c) tubes
   d) axis

6. Which of the following is a low-pressure boiler?
   a) Babcock and Wilcox boiler
   b) Benson boiler
   c) Lancashire
   d) Lamont Boiler

7. Which of the following statement is FALSE about boilers?
   a) Portable boilers are also called as mobile boilers
   b) Lamont boiler is a forced circulation type boiler
   c) Cochran boiler is a high pressure boiler
   d) Horizontal boilers occupy more space

8. Which of the following statement is TRUE about fire tube and water tube boilers?
   a) Fire tube boilers have high risk of bursting than water tube boilers

b) Water tube boilers have high risk of bursting than fire tube boilers

c) Bursting of boilers isn't possible

d) It depends upon the quality of water fed to the boiler

9. Which of the following is NOT a forced circulation boiler?

    a) Velox boiler   c) Lamont boiler

    b) Lancashire boiler   d) Benson boiler

10. Which of the following is NOT true about Babcock and Wilcox boiler?

    a) Water tube boiler   c) High pressure boiler

    b) Externally fired   **d) Single tube**

11. Which of the following is a single tube boiler?

    a) Cornish boiler   c) Benson boiler

    b) Lancashire boiler   d) Cochran boiler

12. In natural circulation boilers, water circulation takes place due to natural convection current produced by the application of heat.

    a) True   b) False

13. Stationary boilers are used for _____

    a) locomotive applications   **c) power plant steam generation**

    b) temporary applications   d) marine application

14. Which of the following factors is NOT considered while selecting a boiler?

    a) Available floor area   c) Available fuel and water

    b) Number of tubes in the boiler   d) The portable load factor

15. What is the usual geometry of a boiler shell?

    a) Torus   c) Cubical

    b) Cuboidal   **d) Cylindrical**

16. The function of "Setting" (Boiler term) is to confine heat to the boiler and form a passage for gases.

    a) True   b) False

17. _____ is the platform in the furnace upon which fuel is burnt.

    a) Shell   c) Setting

    b) Grate   d) Heat exchanger

18. What is the chamber formed by the space above the grate and below boiler shell called, where combustion takes place?

    a) Grate surface   **c) Furnace**

    b) Mounting   d) Setting

19. In boiler terminology, the volume of the shell occupied by water is termed as _____

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY   Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

a) water space   c) wet volume

b) steam space   d) wet space

20. The items that are added to a boiler for safe operation are called _____

a) safety components   c) accessories

b) setting   **d) mountings**

21. The items that are added to increase the efficiency of boiler are called _____

a) mountings   c) setting

b) accessories   d) boiler essentials

22. According to boiler terminology, Formation of steam bubbles on the surface of water is called _____

a) foaming   c) lagging

b) scale   d) bubbling

23. Which of the following is a refractory material?

a) Fire brick   c) Wood

b) Plastic   d) Paper

24. Furnace is also called fire-box.

a) True   b) False

25. In Simple Vertical boiler, the ash that falls off from the grate falls in the _____

a) sink   c) ash disposer

b) ash pit   d) down-header

26. What is the highest steam production rate that can be achieved by Simple Vertical boiler?

a) 1000 kg/hr   c) 3000 kg/hr

b) 2500 kg/hr   d) 5000 kg/hr

27. What is the purpose of fire door in boilers?

a) It is opened to increase air supply for combustion

b) It is opened to put out the fire, in case of emergency

c) It allows the hot gases to pass safely through chimney

d) It is used to feed fuel for combustion

28. Cochran boiler is a multi-tube boiler.

a) True   b) False

29. What is the maximum working pressure of Cochran boiler?

a) 8 bar   **c) 15 bar**

b) 10 bar   d) 20 bar

30. Which of the following boiler mounting is NOT present in a Cochran boiler?

a) Stem stop valve   b) Blow off cock

c) Safety valve **d) Fusible plug**

31. Water tube boilers are further classified into horizontal straight tube and bent tube boilers.

a) True   b) False

32. Which of the following is a horizontal straight tube boiler?

a) Lancashire boiler   c) Stirling boiler

b) Babcock and Wilcox boiler   d) Locomotive boiler

33. In Babcock and Wilcox boiler, just before entering the superheater the steam enters _____

a) uptake header   c) main stop valve

b) down take header   **d) antipriming pipe**

34. Stirling boiler is _____

a) a fire tube boiler

b) a bent-tube (water tube) boiler

c) a horizontal straight tube (water tube) boiler

d) a high-pressure boiler

35. What purpose do baffle plates serve in a Babcock and Wilcox boiler?

a) They direct the flow of water

b) They direct the flow of steam

c) They direct the flow of hot gases

d) They direct the flow of air to combustion chamber

36. Which of the following is NOT a unique feature of high pressure boiler?

a) Water circulation method   **c) Firing method**

b) Tubing type   d) Improved method of heating

37. The main drawback of LaMont boilers is _____

a) limited capacity of evaporating drum

b) bubble formation on the inner surface of heating tubes

c) hindrance in the flow of hot gases

d) radiant superheater decreases the efficiency

38. Which of the following statements about Benson boiler is correct?

a) It requires large surface area

b) It is prone to explosions more than other boilers

c) It takes a lot of time to start

d) It is lighter than other boilers

39. Superheated vapour behaves

a) Exactly as gas
    c) As ordinary vapour

b) As steam
    d) Approximately as a gas

40. The fuel mostly used in steam boilers is

a) Brown coal
    c) Coking bituminous coal

b) Peat
    d) Non-coking bituminous coal

41. For which of the following substances, the gas laws can be used with minimum error

a) Dry steam
    c) Saturated steam

b) Wet steam
    d) Superheated steam

42. The economiser is used in boilers to........

a) Increase thermal efficiency of boiler

b) Economise on fule

c) Extract heat from the exhaust the gases

d) Increase flue gas temperature

43. Size of boiler tubes is specified by

a) Mean diameter and thickness

b) Inside diameter and thickness

c) Outside diameter and thickness

d) Outside diameter and inside diameter

44. The high-pressure boiler is one, which produces Steam at a pressure more than

a) Atmospheric pressure
    c) 10 kg/cm²

b) 5 kg/cm²
    d) 7580 kg/cm²

45. The diameter of tubes for natural circulation boiler as compared to Controlled circulation boilers is

a) More

b) Less

c) Same

d) Could be more or less depending on other factors

46. When the inlet pressure of steam is equal to the exit pressure, then

a) There is a pressure drop in the nozzle

b) Fluid flows through the nozzle

c) Pressure drops and fluid flows through the nozzle

d) There is no pressure drop and fluid does not flow through the nozzle

47. In water tube boilers

a) Water passes through the tubes which are surrounded by flames and hot gases

b) The flames and hot gases pass through tubes which are surrounded by water

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

c) Forced circulation takes place

d) None of these

48. Which of the following is a fire tube boiler?

    a) Locomotive boiler

    b) Babcock and Wilcox boiler

    c) Stirling boiler

    d) All of the above

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

4. STEAM TURBINE

Position in Question Paper   **Total Marks-12**

Q.1. c) 2-Marks.
Q.2. b) 4-Marks.
Q.4. b) 6-Marks.

Descriptive Question

1. Define Mach number and critical pressure.

2. Explain bleeding of steam.

3. State the term governing of turbine and explain nozzle control governing.

4. Explain principle of working of Impulse steam turbine with neat sketch.

5. Explain the necessity of compounding in steam turbine and draw a neat sketch of pressure velocity compounding.

6. Explain choked flow condition in nozzle.

7. How steam turbines are classified?

8. Explain different losses in steam turbine.

9. State the advantages of regenerative feed heating.

10. Explain with neat sketch, construction and working of impulse turbine.

11. List out any six losses in steam turbine.

MCQ Question

(Total number of Question=Marks*3=14*3=42)

Note: Correct answer is marked with **bold.**

1. A steam nozzle is a passage of varying cross section through which the kinetic energy of steam is converted into heat energy.
   a) True   **b) False**

2. Which of the following statements about steam nozzles is FALSE?
   a) It converts the heat energy of the steam into kinetic energy
   b) It has a varying cross section
   c) The smallest section is called throat
   d) The pressure at the outlet is more than at the inlet

3. The smallest section of a steam nozzle is called _____
   a) maw   **c) throat**
   b) neck   d) muzzle

4. The steam flow though nozzle is considered to be _____
   a) adiabatic   c) isothermal
   b) isobaric   d) isochoric

5. The final velocity obtained after passing the steam through a nozzle is less than the calculated one. Which of the following is NOT a valid reason for the same?
   a) Friction between steam and nozzle surface
   b) Steam not being superheated
   c) Shock loses
   d) Internal friction of steam

6. Which of the following is NOT an effect of frictional loses in a convergent-divergent nozzle?
   a) Enthalpy drop is increased
   b) The expansion is not isentropic
   c) The final dryness fraction of the steam is increased
   d) The specific volume of steam is increased

7. Presence of friction in a convergent-divergent nozzle, decreases the final velocity of the steam and increases the dryness fraction of the steam.
   a) True   b) False

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

8. Choose the most appropriate statement regarding velocity coefficient.

a) It can be zero

b) It can be greater than one

c) It should strictly lie between zero and one

d) It is square of nozzle efficiency

9. What is Mach number?

a) It is the ratio of sonic velocity of a fluid at N.T.P. to the local sonic velocity of the same fluid

b) It is the ratio of fluid velocity to sonic velocity of the same fluid at N.T.P.

c) It is the ratio of local sonic velocity to fluid velocity

d) It is the ratio of fluid velocity to local sonic velocity

10. In case of accelerated flow, when the pressure decreases along the flow direction and Mach number is less than one, it corresponds to _____

a) Convergent part of a nozzle

b) Divergent part of a nozzle

c) Throat of a nozzle

d) Convergent part of a diffuser

11. Which of the following statements regarding the Mach number is TRUE, when the fluid reaches the throat of a nozzle?

a) It becomes unity

b) It is less than one

c) It is greater than one

d) Mach number is not defined at throat of a nozzle

12. A decelerated flow, having fluid velocity greater than the local sonic velocity corresponds to _____

a) Convergent part of a nozzle

b) Divergent part of a nozzle

c) Convergent part of a diffuser

d) Divergent part of a diffuser

13. Steam turbine produces useful work in the form of rotation of turbine shaft, by extracting thermal energy from pressurized steam.

a) True   b) False

14. According to the number of pressure stages, steam turbines are classified into _____

a) single cylinder and multi-cylinder   c) mono stage and multi-stage

b) single stage and multi-stage   d) axial and radial

15. According to the direction of steam flow, steam turbines are classified into _____

    a) axial and radial　　　　　　　c) upstream and downstream

    b) uniaxial and multi-axial　　　　　d) forward and backward

16. Turbines with separate rotor shafts for each cylinder placed parallel to each other are known as _____

    a) multi-rotor turbines　　　　　　c) single-cylinder turbines

    b) multiaxial turbines　　　　　　d) multi-utility turbine

17. On the basis of method of governing, steam turbines are classified into turbines with _____

    a) diffuser governing and nozzle governing

    b) throttle governing and nozzle governing

    c) impulse governing and reaction governing

    d) throttle governing and diffuser governing

18. Stationary turbines with variable speed cannot be used to drive _____

    a) turbo-blowers　　　　　　　　c) pumps

    b) air-circulators　　　　　　　　**d) ships**

19. Which of the following statements about reaction turbines is TRUE?

    a) Steam pressure drops suddenly

    b) The complete expansion of the steam takes place inside nozzle

    c) Steam pressure is not altered as the steam moves over the blades the turbine

    d) Steam pressure gradually drops as the steam moves over the blades of the turbine

20. In case of reaction turbines, the magnitude of velocity of steam relative to moving blade increases as the steam progresses.

    a) True　　　　　　　　　　　　b) False

21. The degree of reaction of a Parson's reaction turbine is _____

    a) 0%　　　　　　　　　　　　　**c) 50%**

    b) 25%　　　　　　　　　　　　　d) 100%

22. The gas turbine cycle with regenerator improves

    a) Work ratio　　　　　　　　　　c) Avoid pollution

    b) Thermal efficiency　　　　　　d) None of these

23. Reheating in a gas turbine

    a) Increases the compressor work　　**c) Increases the thermal efficiency**

    b) Increases the turbine work　　　　d) Decreases the thermal efficiency

24. An open cycle gas turbine works on

    a) Otto cycle　　　　　　　　　　b) Carnot cycle

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

c) Joule's cycle   d) Stirling cycle

26. In open cycle gas turbine plants

    a) Direct combustion systems is used

    b) A condenser is used

    c) The indirect heat exchanger and cooler is avoided

    d) All of the above

27. The nozzle efficiency is the ratio of

    a) Workdone on the blades to the energy supplied to the blade

    b) Workdone on the blades per kg of steam to the total energy supplied per stage per kg of steam

    c) Energy supplied to the blades per kg of steam to the total energy supplied per stage per kg of steam

    d) None of the above

28. In a reaction turbine when the degree of reaction is zero, then there is

    a) No heat drop in moving blades

    b) No heat drop in fixed blades

    c) Maximum heat drop in moving blades

    d) Maximum heat drop in fixed blades

29. The expansion of steam in a nozzle follows

    a) Carnot cycle   c) Joule cycle

    b) Rankine cycle   d) Stirling cycle

30. In a reaction turbine, when steam flows through the fixed blades,

    a) Pressure increases while velocity decreases

    b) Pressure decreases while velocity increases

    c) Pressure and velocity both decreases

    d) Pressure and velocity both increase

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

5. STEAM Condenser

Position in Question Paper   **Total Marks-12**

  Q.1. c) 2-Marks.
  Q.2. b) 4-Marks.
  Q.4. b) 6-Marks.

Descriptive Question

1. Differentiate between natural draught and forced draught cooling tower.

2. State any three functions of steam condenser.

3. Explain with neat sketch induced draught cooling tower.

4. State the sources of air leakage in condenser.

5. Draw a neat sketch of surface condenser and label it.

6. Explain any 2 types of Condenser with neat sketch.

7. Explain any 2 types of Cooling tower with neat sketch.

MCQ Question

(Total number of Question=Marks*3=14*3=42)

Note: Correct answer is marked with **bold.**

1. Steam condenser converts steam into water.
  a) True   b) False

2. Steam condensers help in maintaining high back pressure on the exhaust side of the piston of a steam engine.
  a) True   **b) False**

3. Sub-atmospheric pressure is also called _____
  a) Gauge pressure   **c) Vacuum pressure**
  b) Absolute pressure   d) High altitude pressure

4. Which of the following is NOT an element of a steam condensing plant?
  a) Supply of cooling water   c) Condenser
  b) Turbine   d) Wet air pump

 5. Discharging condensate to hot well improves plant efficiency because _____
  a) condensate is not wasted
  b) condensate cools down faster in the hot well
  c) feed water for boiler is taken from the hot well
  d) it increases the pressure in the hot well

6. Steam condensers are classified into _____
  a) jet condensers and fast condensers
  b) jet condensers and surface condensers
  c) high condensers and surface condensers
  d) slow condensers and jet condensers

7. Cooling water is sprayed into the exhaust steam in _____
  a) steam condensers   **c) jet condensers**
  b) surface condensers   d) jet condensers and high condensers

8. Which of the following statements is TRUE about single-pass condenser?
  a) It is a type of jet Condenser
  b) The flow of water is in one direction only
  c) The water flows in one direction through some tubes and returns through the remainder
  d) It is not used to condense steam

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

9. Which of the following is NOT a type of jet condenser?

a) Parallel flow type

b) counter flow type

c) Ejector type

d) Central flow type

10. Parallel flow type condensers are further classified into _____

a) high speed type and low speed type condensers

b) high steam type and low steam type condensers

c) high level type and low level type condensers

d) high capacity and low capacity type condensers

11. Counter-flow type jet condensers are classified into – Low-level type and High level type jet condensers.

a) True

b) False

12. What is the function of baffle plate in parallel flow type low level jet condenser?

a) It keeps cooling water and exhaust steam from mixing

b) It ensures proper mixing of cooling water and exhaust steam

c) It collects condensate over it for extraction

d) It helps condenser wall withstand the inside pressure

13. Where is condensate extraction pump provided in case of low-level parallel flow type jet condenser?

a) At the bottom of the condenser

b) At the top of the condenser

c) Near the baffle plate

d) Near the steam entry point

14. Which of the following condensers does not require a condensate extraction pump?

a) Low level parallel flow type jet condenser

b) Low level counter flow type jet condenser

c) High level counter flow type jet condenser

d) Central flow type surface condenser

15. Which of the following is NOT a type of surface condenser?

a) Regenerative type

b) Evaporative type

c) Inverted-flow type

d) Ejector type

16. Which of the following condensers is also called cross-surface condenser?

a) Inverted-flow type

b) Evaporative type

c) Down-flow type

d) Central-flow type

17. Radial flow of steam is observed in _____

a) down-flow type surface condenser

b) central-flow type surface condenser

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

c) regenerative type surface condenser

d) evaporative Surface condenser

18. Which of the following condensers has air suction located at the top?

a) Down-flow type surface condenser

b) Central-flow type surface condenser

c) Inverted-flow type surface condenser

d) Evaporative condenser

19. _____ works best when the availability of cooling water is limited.

a) Down-flow type surface condenser

b) Regenerative type surface condenser

c) Inverted-flow type surface condenser

d) Evaporative condenser

20. In down-flow type surface condensers, the plate that separates the water box into two sections is called _____

a) baffle plate   c) partitioning plate

b) separating plate   d) divider

21. Where is the suction pipe of the air suction pump located in central-flow type surface condensers?

a) At the centre of the tubes

b) At the top of condenser shell

c) At the bottom of the condenser shell

d) Near the pipe of condensate extraction pump

22. Which of the following statements is not a correct reason for inefficiency in surface condensers?

a) Air leakage

b) High resistance faced by the steam while entering

c) Condensate undercooling

d) Circulating water passing through the condenser almost smoothly

23. Surface condensers require more power for water pumping than jet condensers.

a) True   b) False

24. What is the effect of air leakage in condensers on thermal efficiency of the steam power plant?

a) Thermal efficiency gets lowered

b) Thermal efficiency increases

c) Thermal efficiency remains unchanged

d) It increases or decreases depending upon the degree of leak

25. How does air leakage in a condenser affect the requirement of cooling water?

    a) Air leakage reduces the amount of cooling water required

    b) Air leakage increases the amount of cooling water required

    c) Air leakage doesn't affect the amount of cooling water required

    d) Amount of cooling water required increases or decreases depending upon the rate of air leakage

26. How does air leakage in condensers affect the heat transfer rate?

    a) Heat transfer is reduced

    b) Heat transfer is increased

    c) Heat transfer rate is not affected by air leakage

    d) Heat transfer rate increases or decreases depending on the rate of air leakage

27. What effect does air leakage in a condenser has on corrosion?

    a) Air leakage reduces corrosion

    b) Air leakage increases corrosion

    c) Air leakage does not affect corrosion

    d) Corrosive action increases or decreases depending upon the degree of leak

28. Which of the following is not an effect of air leakage in condensers?

    a) Reduced thermal efficiency of steam power plant

    b) Increased requirement of cooling water

    c) Increase in corrosive action in condenser

    d) Increased heat transfer in condenser

29. What is the function of a cooling tower in a power plant?

    a) It cools the hot water coming back from the condenser

    b) It cools the hot water being supplied to the condenser

    c) It heats the cold water coming back from the condenser

    d) It heats the cold water being supplied to the condenser

30. Which of the following phenomenon is used to cool water in a cooling tower?

    a) Evaporation   c) Condensation

    b) Radiation   d) Conduction

31. Which of the following phenomenon is used to cool water in a cooling tower?

    a) Evaporation   c) Condensation

    b) Radiation   d) Conduction

32. Humidity of air affects the cooling of water in a cooling tower.

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

a) True   b) False

33. The cooling of water is affected by degree of uniformity in descending water.

    a) True   b) False

34. Based on the material, with which the towers are made, cooling towers are classified into _____

    a) Timber towers, Concrete towers and Alloy duct type

    b) Induced and forced draught type

    c) Induced and natural draught type

    d) Timber towers, Concrete towers and Steel duct type

35. Which of the following statements about timber towers is False?

    a) Timber towers have longer life than concrete and steel duct type towers

    b) Timber towers have high maintenance charges

    c) Timber towers have limited cooling capacity

    d) Timber towers are rarely used

36. Thermal power plant works on

    a) Carnot cycle   **c) Rankine cycle**

    b) Joule cycle   d) Otto cycle

37. A condenser condenses the steam coming out from

    a) Boiler   c) Economiser

    b) **Turbine**   d) Super heater

38. Water used in the steam plant is used for cooling in

    a) Condenser   c) Boiler tube

    b) Turbine only   d) Boiler tubes and turbines

39. What is use of the air pumps in the condenser?

    a) Remove water

    b) Air leaking in the condenser and to maintain the vacuum.

    c) Maintain atmospheric pressure and the condenser.

    d) Both (a) & (b).

40. Evaporative type of condenser has

    a) Water in pipes surrounded by steam outside.

    b) Steam and cooling water mixed to give the condensate.

    c) Steam in pipes surrounded by water.

    d) None of the above.

41. The commonly used material of pipes in condensers is.......

    a) Mild steel   b) Stainless steel

c) Cast iron   **d) Admiralty brass**

42. The ratio of actual vaccum to the ideal vaccum in a condenser is called.......
   a) Condenser efficiency
   b) Vaccum efficiency
   c) Boiler efficiency
   d) Nozzle efficiency

43. A condenser in a steam power plant is.......
   a) Increases expansion ratio of steam
   b) Reduces back pressure of steam
   c) Reduces temperature of exhaust steam
   d) All of the above

44. Which of the following is the simplest method of Cooling the condenser water?
   a) Spray cooling pond
   b) Cooling tower
   c) Indirect air cooling
   d) Hyperbolic cooling tower

45. What type of cooling system is used in the large power plants?
   a) Cooling ponds
   b) Natural flow system
   c) Cooling towers
   d) Single deck system

6. HEAT TRANSFER AND HEAT EXCHANGERS

Position in Question Paper   **Total Marks-12**

  Q.1. c) 2-Marks.
  Q.2. b) 4-Marks.
  Q.4. b) 6-Marks.

Descriptive Question

1. State Dalton's law of partial pressure.
2. Define Fourier's law.
3. Define gray body.
4. State Dalton's law of partial pressure.
5. Explain with neat sketch. Construction and working of plate type heat exchanger. State its applications.
6. A steel pipe of inner and outer diameter 6 cm and 8 cm respectively has inside temperature 140°C and outside temperature 50°C. The thermal conductivity of steel is 24 W/mk.Calculate the rate of heat transfer through the pipe if length of pipe is 1.5 m.
7. Define:
    a. Transmissivity
    b. Black body
    c. Grey body
    d. Reflectivity
8. State:
    a. Fourier's law
    b. Newton's law of cooling
    c. Radiation and
    d. Thermal conductivity

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

MCQ Question

(Total number of Question=Marks*3=14*3=42)

Note: Correct answer is marked with **bold.**

1. If the radius of any current carrying conductor is less than the critical radius, then why the addition of electrical insulation will enable the wire to carry a higher current?
   a) The heat loss from the wire would decrease
   b) The heat loss from the wire would increase
   c) The thermal resistance of the insulation is reduced
   d) The thermal resistance of the conductor is increased

2. Which of the following substance has the minimum value of thermal conductivity?
   a) Air   c) Plastic
   b) Water   d) Rubber

3. The outer surface of a long cylinder is maintained at constant temperature. The cylinder does not have any heat source. The temperatures in the cylinder will _____
   a) Increase linearly with radius
   b) Decrease linearly with radius
   c) Be independent of radius
   d) Vary logarithmically with radius

4. As the temperature increases, the thermal conductivity of a gas _____
   a) Increases
   b) Decreases
   c) Remain constant
   d) Increases up to a certain temperature and then decreases

5. Which of the following non-dimensional numbers is used for transition from laminar flow to turbulent flow in the free convection?
   a) Reynolds number   c) Peclet number
   b) Grashoff number   d) Rayleigh number

6. Which of the following parameter is not responsible for loss of heat from a hot surface in room?
   a) Temperature of the surface   c) Temperature of the air in the room
   b) Emissivity of the surface   **d) Dimensions of the room**

7. Which of the following statement is incorrect?
   a) For metals, the value of absorptivity is high

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

b) For non-conducting materials, reflectivity is low

c) For polished surfaces, reflectivity is high

d) For gases, reflectivity is very low

8. A periodic type heat exchanger is known as _____

    a) Direct contact heat exchanger   c) Recuperator

    b) Indirect contact heat exchanger   **d) Regenerator**

9. Surface heat exchangers are also known as _____

    a) Direct contact heat exchanger   **c) Recuperator**

    b) Indirect contact heat exchanger   d) Regenerator

10. In which type of heat exchanger the same space is occupied by the hot and cold gases, between which heat is exchanged?

    a) Recuperator   c) Direct contact heat exchanger

    b) Regenerator   d) Indirect contact heat exchanger

11. Which of the following is not an application of regenerator?

    a) Jet condenser   c) Oxygen producer

    b) Steam power plant   d) Blast furnace

12. In which of the following recuperator heat exchanger is not used?

    a) Evaporator   c) Automobile radiators

    b) Chemical factories   d) Condensers

13. In which of the following type of heat exchanger the heat exchange between the two fluids occur by their complete physical mixing?

    a) Direct contact heat exchanger   c) Recuperator

    b) Indirect contact heat exchanger   d) Regenerator

14. Unit of thermal conductivity in M.K.S. units is

    a) kcal/kg m2 °C   c) kcal/hr m2 °C

    b) kcal-m/hr m2 °C   d) kcal-m/hr °C

15. Thermal conductivity of solid metals with rise in temperature normally

    a) increases

    b) decreases

    c) remains constant

    d) may increase or decrease depending on temperature

16. When heat is transferred from one particle of hot body to another by actual motion of the heated particles, it is referred to as heat transfer by

    a) Conduction   c) radiation

    b) convection   d) conduction and convection

Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

RSM POLY Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

17. A heat exchange process in which the product of pressure and volume remains constant is known as

   a) Heat exchange process   c) Isentropic process

   b) Throttling process   **d) Hyperbolic process**

18. Unit of the rate of heat transfer is

   a) Joule   c) Pascal

   b) Newton   d) Watt

19. Convective heat transfer coefficient doesn't depend on

   a) Surface area   c) Time

   b) Space   d) Orientation of solid surface

20. How many types of convection process are there?

   a) One   c) Four

   b) Three   d) Two

21. Thermal conductivity is maximum for which substance

   a) Silver   c) Aluminum

   b) Ice   **d) Diamond**

22. Which of the following is an example of forced convection?

   a) Chilling effect of cold wind on a warm body

   b) Flow of water in condenser tubes

   c) Cooling of billets in the atmosphere

   d) Heat exchange on cold and warm pipes